

WALKER LAKE BIRCH STUDY
GATES OF THE ARCTIC NATIONAL PARK AND PRESERVE
SUMMER 1987

Prepared by

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Natural Resources Final Report AR-87/

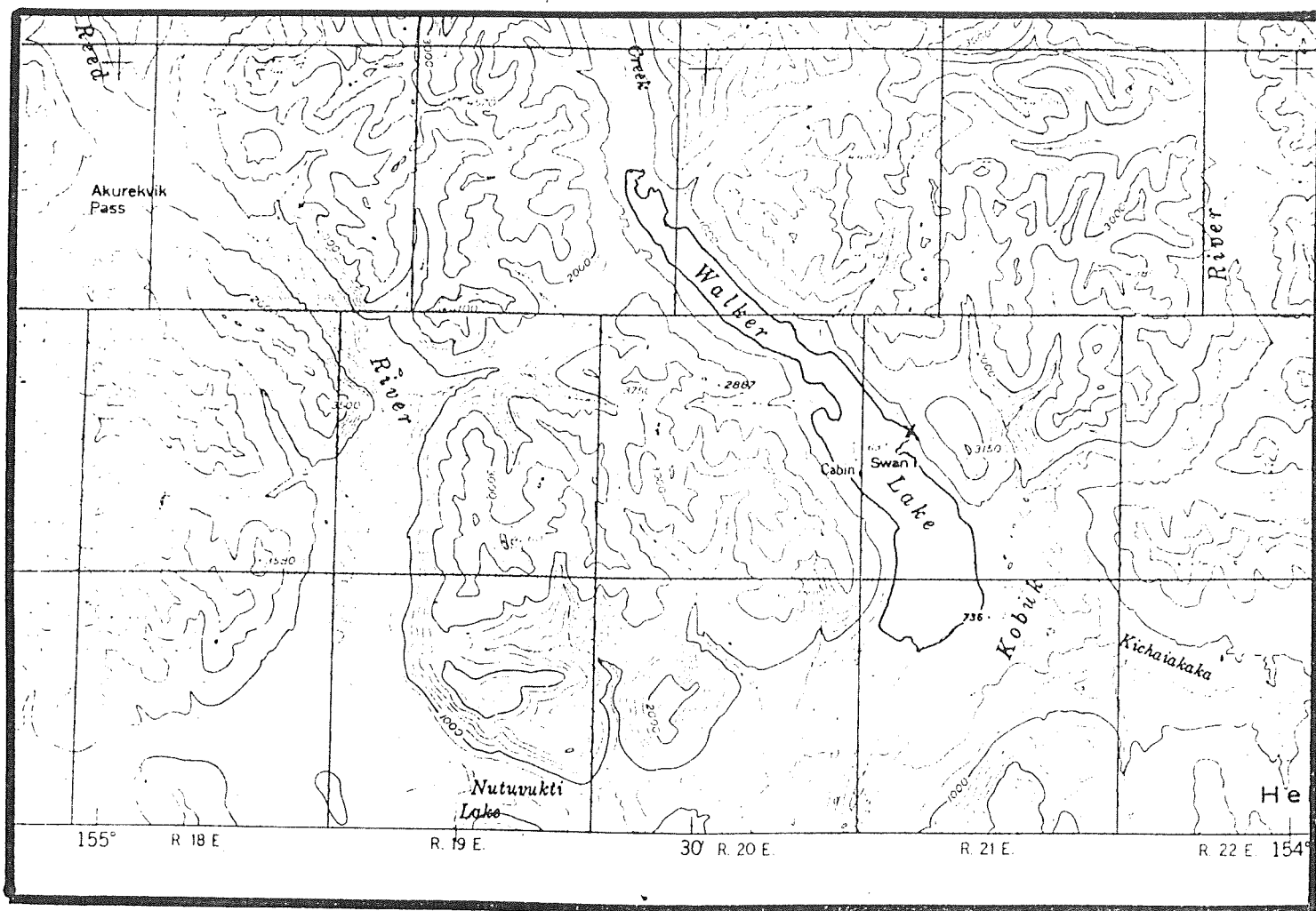
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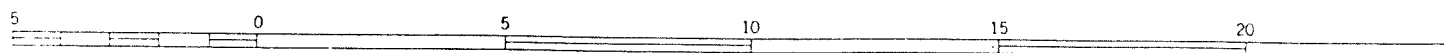
INTRODUCTION

As part of a continuing effort to understand the impact of subsistence firewood harvesting at Walker Lake in Gates of the Arctic National Park, in particular the harvesting of 3 cords of live birch/year, GAAR biological technician Nancy Van Alstine, Cooperative Extension Forester Tony Gasbarro, and Research Forester George Sampson spent July 30 - August 2, 1987 at Walker Lake (see Fig. 1). A study completed in the summer of 1986 (See Van Alstine, Gasbarro, and Sampson, Report on the Walker Lake Firewood Survey in Gates of the Arctic National Park and Preserve) had focused on determining the volume of potential firewood, both spruce and birch, in the southwestern shore area. The goals of this year's trip were as follow: to allow two experienced foresters to see firsthand the status of the birch at Walker Lake; to look at some birch stands in which harvest had occurred in order to assess the techniques and extent of harvesting; if possible, to collect data on the long-term effect of cutting birch on vegetative sprouting; and to produce recommendations for the issuing of future permits.

The observations and conclusions of Tony Gasbarro and George Sampson will be reported first. The details and results of the study conducted in a birch stand will be reported next by Nancy Van Alstine, followed by overall conclusions and management recommendations.



SCALE 1:250000



CONTOUR INTERVAL 200 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929

Fig. 1. Map of the Walker Lake area, part of the Survey Pass Quad. (Birch study area is indicated with an X.)

SUBSISTENCE FUELWOOD CUTTING ASSESSMENT

Prepared by Tony Gasbarro and George Sampson

BACKGROUND

The National Park Service is interested in learning how continued harvesting of birch fuelwood for subsistence use would impact the forests around the shoreline of Walker Lake in Gates of the Arctic National Park. Currently, one part-time resident of the lake has a permit to harvest 3 cords of live birch. This individual has been cutting limited amounts of sawlogs and fuelwood in the area for the past 34 years. Limited harvesting by others also occurred since the gold rush days up until the area was classified as a National Park. We use the word "limited" because we did not encounter any sites where extensive cutting had occurred.

We spent from noon on July 30 to late morning on August 2, 1987 in the Walker Lake area. During that time we were accompanied by Nancy Van Alstine, a National Park Service biological technician who served as our guide. We used a small skiff with an outboard motor to get to various parts of the shoreline during our assessment. We also had an opportunity to fly over most of the lake's shoreline during our flight into the area.

OBSERVATIONS

Fuelwood size trees in the Walker Lake area are mostly found in pure stands of white spruce, in mixed spruce/birch stands or in stands dominated by birch. These latter stands are narrow "stringers" not more than 200 feet wide that extend upslope from the lake shore for several hundred yards. They probably have resulted from soil slippage, snow slides, or fire.

On our flight over most of the lake shore, we were unable to detect any signs of past or current harvesting. Looking shoreward from our skiff in the lake, we were also unable to see evidence of logging activity. In several areas of the lake, when travelling very close to the shore in a boat, we did see a few cut stumps close to the shoreline and observed one cut driftwood log (spruce).

We visited a birch stand identified by the permittee as an area from which he has taken wood "off and on" over the past 30 years. It would have been hard to identify this area as a cutting area had it not been indicated on an aerial photo. There was no evidence of cutting along the shoreline since most of the area adjacent to the water was covered with alder.

As we moved inland and up the slope in this stringer of mostly birch, we began to encounter cut birch stumps. Most of the trees that had been cut were removed from clumps of trees that had sprouted from the same stem. Only one or two trees had been removed from each clump. In many cases these stumps had

sprouted again. Stumps in areas shaded by alder or other birch trees did not show much sprouting. We encountered a few places in this stand where a small group selection harvest had been made. We were later informed by the permittee that this was done only where there were several old and rotten trees growing together. On the whole, this stand was very lightly harvested even though the permittee said that he had made several entries into the stand over a 30 year period. We collected data within this stand to assess the amount of stump sprouting that occurred after the birch were harvested. We also took seven birch increment cores to determine the age of the stand and measured its basal area at several locations. The results will be reported by Nancy Van Alstine.

This birch stand was harvested by hand. We did not encounter any damage done to the residual stand by harvesting operations. Trees were harvested up to 220 feet from the shoreline. This stand was the only one where we encountered significant cutting. The permittee indicated that there were several other areas he had harvested in the same manner. He identified some of these on aerial photos, but we were unable to find these. Therefore, our impressions of how the birch is harvested is based only on this one area.

We had a chance to visit the permittee, Mr. Bud Helmericks, on Swan Island in Walker Lake. We chatted with him for about an hour about his fuelwood gathering. The following are some of the observations that we made from talking with Mr. Helmericks:

- * Mr. Helmericks has a good understanding of forest succession in the area. For example, he told us that in addition to harvesting in the mixed or pure birch stands, he also goes after old birch trees that are being overtopped by spruce because he knows that it will not be long before the birch will succumb to the spruce.
- * We did not see any indication that Mr. Helmericks has stored large volumes (5 or more cords) of fuelwood near his home. His woodshed was very small and the fuelwood stored outside did not amount to more than 1/2 cord. This suggests to us that Mr. Helmericks probably does not use as much wood as his permit request indicates. However, this could change if he decides to spend more time at Swan Island.
- * Mr. Helmericks' wood pile was revealing. There were a large number of pieces with rotten wood in his fuelwood pile. It appears that he is very conscientious about utilizing all of the wood that he harvests and is willing to take back to his homesite wood of marginal heating value. We also noted some very large birch in the woodpile and were surprised that such large trees grew in the area. (Note: a cross section (diameter approx. 15 inches) of this tree given to us by Mr. Helmericks had 141 rings, so this tree was at least that old.) The fuelwood pile contained dry spruce indicating that he is harvesting dead spruce when the the opportunity arises.

CONCLUSIONS

As we have already indicated, we thoroughly investigated only one cutting area. We could not readily find other areas where substantial harvesting had supposedly occurred. Our conclusions will be based on our observations of that area, information that we obtained during our interview with Mr. Helmericks and the fact that there has been very little noticeable alteration of the various forest stands adjacent to Walker Lake.

These are our conclusions:

- * Mr. Helmericks is very conscientious about keeping the Walker Lake area visibly attractive as evidenced by the conservative and painstaking harvesting that he has done in past.
- * We doubt that Mr. Helmericks will waste any wood. Although it appears that he is asking for a permit for more wood than he has used in the past, he may be planning to spend more time on the lake.
- * The selective harvesting that he is doing in the birch stands may or may not perpetuate these stands. It appears that sufficient sprouting is occurring, but it is also possible that young sprouts will be shaded by other birch or invading alder and may not survive. Research has shown that sprouting ability declines with age. His cutting may be

allowing the birch stands to survive longer than they would otherwise, but unless there is major soil disturbance or fire the birch will eventually decline in the area.

* At the current level of harvesting, there is no danger that there will be major alteration of any of the forest ecosystems along the lakeshore. The National Park Service should continue to monitor the harvesting. If there is time, a brief assessment should be made of the harvesting taking place in the spruce stands.

* Perhaps a greater threat, in the long run, to the integrity of the forests along the Walker Lake shoreline will be from harvesting related to recreational campfires. This harvesting will probably be concentrated in the areas of the better camping sites on the lakeshore and could create both aesthetic and ecological problems.

THE EFFECT OF HARVESTING ON THE VEGETATIVE
REPRODUCTION OF PAPER BIRCH (BETULA PAPYRIFERA)

Prepared by
Nancy Van Alstine

BACKGROUND

One potential effect of cutting paper birch (Betula papyrifera) that has been put forth as a benefit of harvesting birch around Walker Lake is that vegetative reproduction (sprouting) would be promoted, thereby extending the life of the birch stands. We have no data on this for Walker Lake and a rigorous investigation of the effects of harvesting on regeneration would require a long-term study. In lieu of a long-term study, we felt that some preliminary answers might be found by collecting data on sprouting in a stand from which birch had been harvested in the past.

METHODS

Site Description

Prior to our trip to Walker Lake, Bud Helmericks, the individual who harvests wood under a subsistence firewood permit, had identified on an aerial photo several areas from which he has harvested birch. We were unable to find evidence of birch harvesting in two of these sites, one in the southeastern corner

and the other in the southwestern corner of the lake, but we did find birch stumps in an area on the eastern shore, across from Swan Island and north of the peninsula (see Fig. 2). The study area, .31 acres, consisted of a stand of birch with an understory of alder and white spruce and, in open areas, patches of raspberry and grass. The stand, on a slope of approximately 40%, was included in one strip, 100 ft long x 97 ft wide and another strip 70 long x 40 ft wide just north of a small ravine. (Due to the slope, a correction factor of 1.077 was used in calculating the area.) There were 44 birch stumps found in this stand; generally the trees were cut 2-3 feet from the base. The farthest up the slope that a birch stump was found was 221 ft. According to Helmericks, this stand has been cut over a period of 30 years, with the most recent birch harvest being 3 years ago.

Data Collected

To help answer the question of what the effect of cutting birch is on vegetative reproduction, we conducted a census of the birch stumps, recording the number of sprouts, diameter of the stump (above any flaring at the base), and whether the stump was in an open or shaded microhabitat.

We looked at sprouting on uncut birch within 5 variable-size plots on which we were also determining basal area of the stand using a prism (English BAF = 10). Basal area, the area of the cross section of all the trees in the stand, was measured as a way to characterize the site. There were a total of 50 uncut trees sampled in these 5 plots.

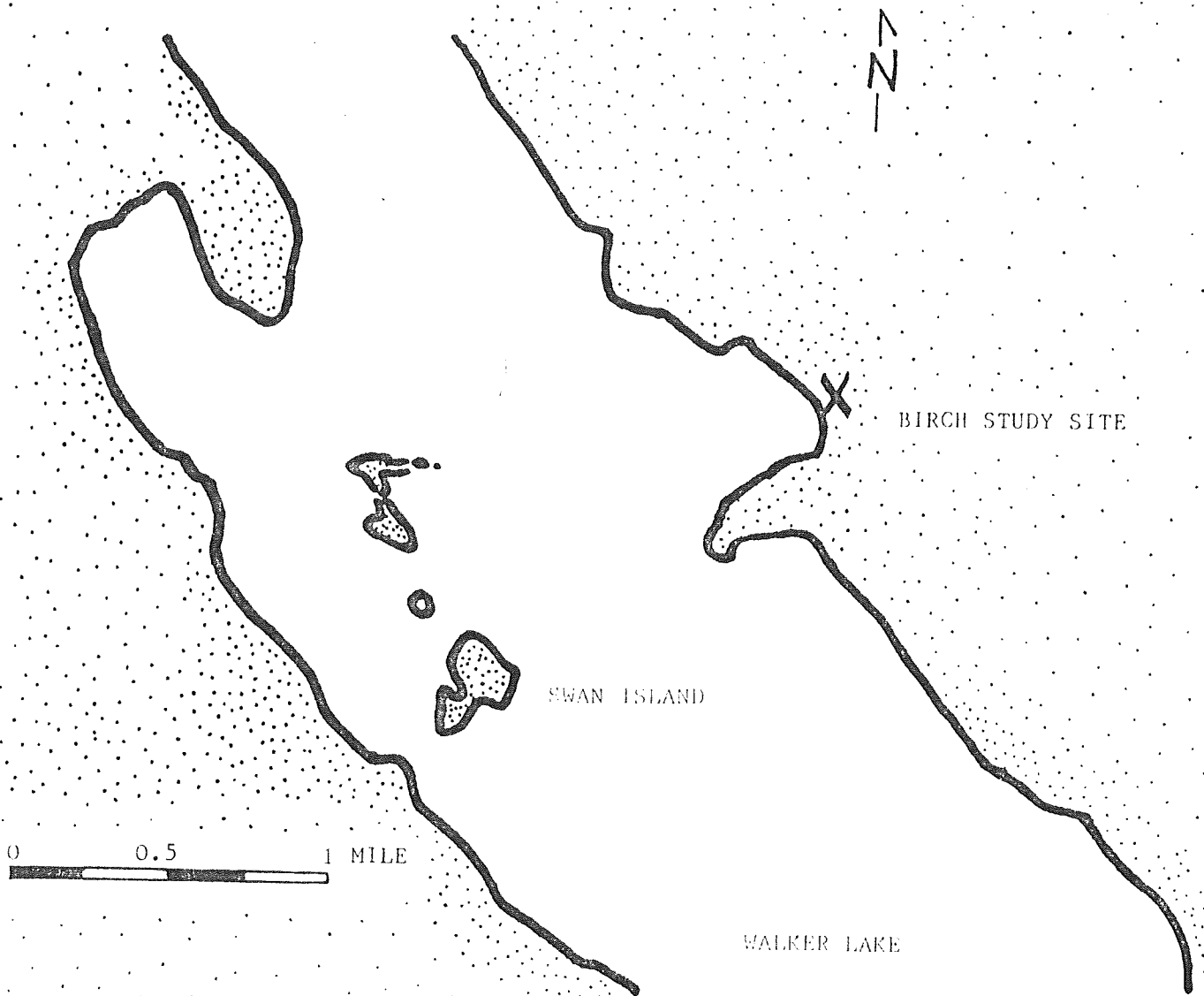


Fig. 2. Close-up of the location of the 1987 birch study site at Walker Lake.

In order to determine ages of birch in this stand, we extracted cores from 7 healthy co-dominant birch trees as close to the stem base as possible (approx. 10 inches: being able to extract a core near the base is limited by the length of the extractor handle) and recorded their diameters at breast height (DBH).

RESULTS

Stand Characteristics

Basal area of birch in this stand averaged 100 sq ft/acre. Ages of the uncut birch ranged from 54 - 62 years with DBH's ranging from 4.8" - 6.0" (in this small number of samples and narrow age range there was not a positive correlation between DBH and age). The birch sampled in the southwestern shore area in the 1986 study included birch of these ages, but there were also trees 96 - 150 years old in the southwestern area, ages which were not represented in this stand.

Vegetative Reproduction

The results of the sprouting survey are shown in Table 1 below:

Table 1. Mean number of sprouts per live birch tree and per birch stump in the study area \pm standard deviation. Sprouts from stumps are further identified as to whether they were in an open or shaded microhabitat. (n = sample size of trees or stumps)

	Birch tree	Stump	
		Shaded	Open
Number of sprouts/tree or stump	0.98 \pm 0.5 (n = 50)	0.22 \pm 0.54 (n = 19)	1.62 \pm 1.93 (n = 21)

Cut birch stumps in an open microhabitat tended to show more sprouts than uncut birch in this stand. The difference was statistically significant (using a t test) at $\alpha = .10$ (although not at $\alpha = .05$). When stumps were in a shaded microhabitat,

sprouting tended to be less than in either stumps in an open microhabitat or uncut birch trees. This difference was statistically significant at $\alpha = .005$.

In addition to the shade vs. open microhabitat factor, age of the birch when cut may play a role in promoting or inhibiting sprouting. Although we did not rigorously record data on age as a factor, if it is assumed that tree diameter is positively correlated with tree age, we can look at the percentage of sprouts produced by stumps within various diameter size classes (Table 2).

Table 2. Comparison of the percentages of stumps and sprouts per diameter size class at the Walker Lake 1987 birch study site. (n = sample size of stumps or sprouts)

	<u>Stump Diameter Size Class</u>		
	< 6.00 "	6.01 - 8.00 "	> 8.01 "
% of total stumps	21 (n = 9)	52 (n = 23)	27 (n = 12)
% of total sprouts	25 (n = 11)	73 (n = 33)	2 (n = 1)

These data show that the oldest trees cut in this stand contributed little to sprout production. Again, sample sizes were too small to allow us to say anything conclusive; more intensive study would be needed to determine if the trend suggested here is real. We had hoped to increase the data base for this study on vegetative reproduction by sampling in other areas from which the subsistence user had harvested birch, but

were unable to find these other areas.

SUMMARY

Based on the preceding data, the most that we can say is that cutting birch may promote sprouting if the tree cut is approximately 7" DBH or less and if the resulting stump lies in an open microhabitat.

OVERALL CONCLUSIONS

The assessment by Gasbarro and Sampson of the permittee's harvesting techniques and the small amount of visual evidence of harvesting points to there being no major alteration to the birch stands around Walker Lake. On the other hand, we are still left with questions about regeneration and whether there is a net loss of birch with the removal of each tree. Data from the 1986 firewood study in the southwestern shore area suggested that sustained yield harvesting of birch might not be possible in that area with single tree selection harvesting. This year's limited data from one birch stand on the eastern shore suggest that sprouting may be promoted only under certain conditions, and we have no data on the long-term survival rate of sprouts in the forests around Walker Lake. Although we do know that any cutting of trees is altering natural processes in some way, and we do not know if it is extending or shortening the existence of the birch, the current level of birch harvesting at Walker Lake appears to be acceptable.

RECOMMENDATIONS OF GAAR NATURAL RESOURCE MANAGEMENT

1. Based on the preceding conclusions and while recognizing that some alteration in the forests and some deterioration of the wild character of the lake area will result, we recommend that the request for harvesting up to 3 cords of live trees per year continue to be approved. Considering the questions we still have about the effects of harvesting, however, we feel that the less birch removed the better, and so advise, as we did in 1986, that a 1/2 spruce: 1/2 birch ratio be followed, if possible.

Application for a firewood harvesting permit should include justification for the amount requested and the minimum amount of wood needed should be approved.

2. The following permit stipulations should be included, most of which are reiterations of previous recommendations (new recommendations are underlined):

a. The subsistence user will inform us of the quantity of wood harvested (cords), the number of trees harvested, and the location of the harvests (shown on a map). It would be helpful to know the number of trees harvested at each location, too.

b. The stumps shall be cut flush with the ground and slash scattered to minimize on-site visual impact.

Although slash from past harvests was not evident in the study area, obvious stumps were left. We have no information on whether the subsistence user complied this

year with this stipulation which was a condition of his 1987 firewood cutting permit.

3. At this time, we do not recommend additional studies of the impact of subsistence firewood harvests at Walker Lake, other than checking for compliance with the permit stipulations. The questions that we still have about the effects of the birch-harvesting would require long-term studies and investments of time and funds that are not warranted by the current level of harvesting.

4. Gasbarro and Sampson state in their conclusions that the harvesting of wood for fires by recreational users could create ecological and aesthetic problems at Walker Lake. The existence of fire rings around Walker Lake have been documented in GAAR's human impact site inventory process and cases of recreational users cutting trees for firewood have occurred at the lake. We recommend continued evaluation of the extent of recreational firewood use. If human impact site inventories indicate the expansion in the number and size of sites, and especially fire rings and other signs of high wood use, we should evaluate the option of limiting or excluding use of fires at Walker Lake.